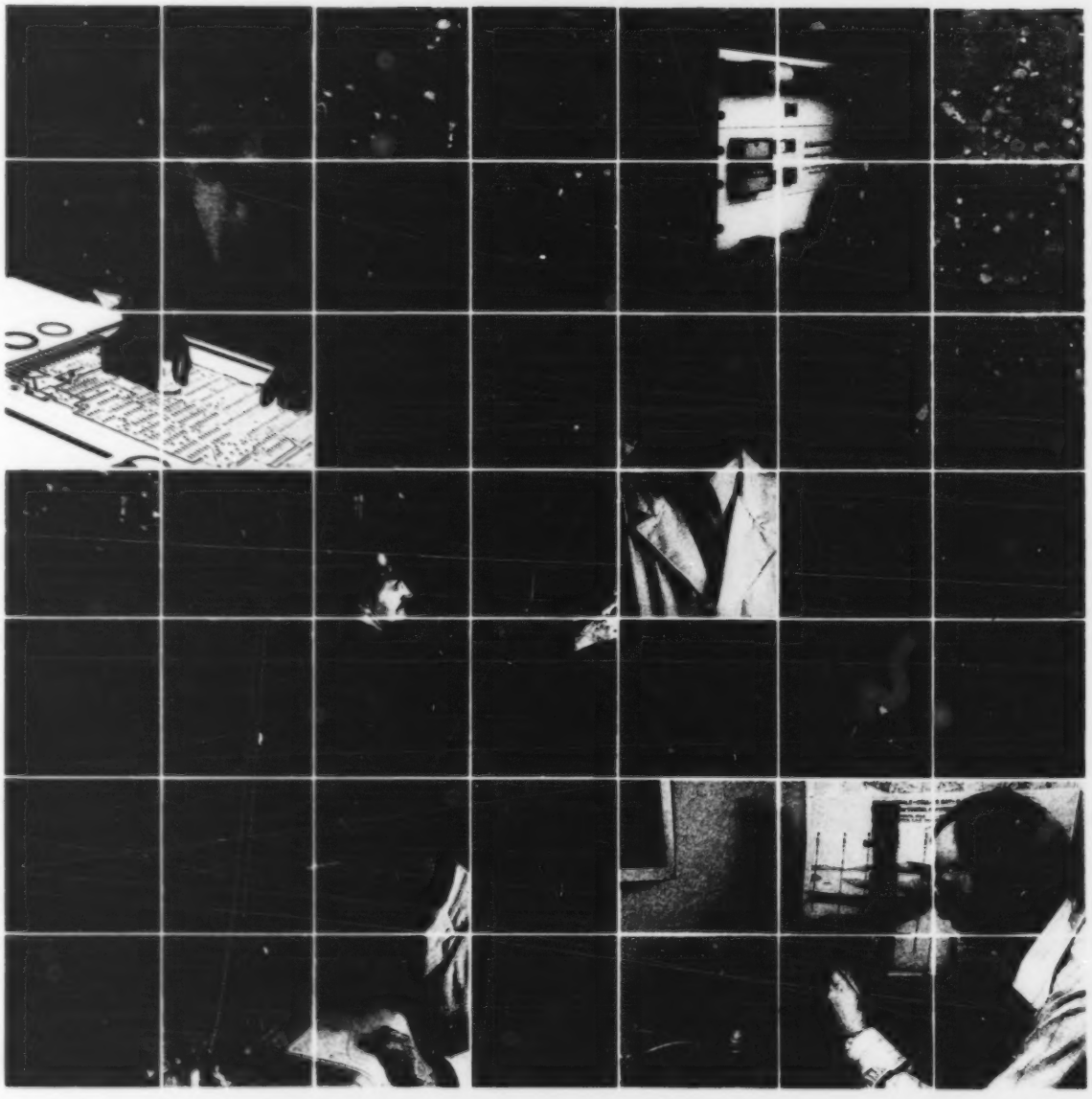
Saskatchewan
Research Council

1984-85 Annual Report



86-03342/

Letter of Transmittal

February 10, 1986

TO THE HONOURABLE F.W. JOHNSON

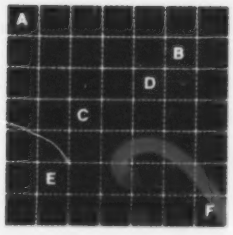
Lieutenant Governor of the Province of Saskatchewan

MAY IT PLEASE YOUR HONOUR:

The undersigned presents herewith, for your consideration, the report of the Saskatchewan Research Council for the year ended March 31, 1985.

Respectfully submitted,

George McLeod
Minister responsible for
Saskatchewan Research Council



A *The Canadian Centre for Advanced Instrumentation (CCAI) supports industry in Canada through design, service, and calibration of electronic and instrumentation equipment. Russ Pinchbeck, of the Electronics Group, produces a printed circuit board design.*

B *The Resources Research Centre operates the province's only SLOWPOKE nuclear reactor, which is used to measure atomic elemental composition of most sample types.*

C *Test pipelining of solids at the Slurry Pipeline Development Centre requires a high capacity pump. Del McEwan checks the motor drive system.*

D *Doug Soveran, Research Engineer in our Petroleum Division, observes the separation of a water-in-oil emulsion.*

E *In our Biomass Resources laboratory, Krystyna Sosulski scans the absorption spectrum of plant materials tested in a spectrophotometer.*

F *Our Mineral Resources program studies the geology of the province as it relates to mineral deposits of uranium, potash, and gold. David Quirt examines samples from a northern Saskatchewan field trip.*

Inset photographs appear on a background of heavy oil core samples and oil-in-water emulsions from our Petroleum Division.

The Research Council Act

Section 21, in part, directs that:

The Council shall on or before the last day of February in each year submit to the Lieutenant Governor in Council a report of its proceedings and transactions during the next preceding calendar year, which report shall contain such particulars as the Lieutenant Governor in Council may prescribe.
Every report shall be laid before the Legislative Assembly if then in session or, if it is not in session, within fifteen days after the opening of the next session.

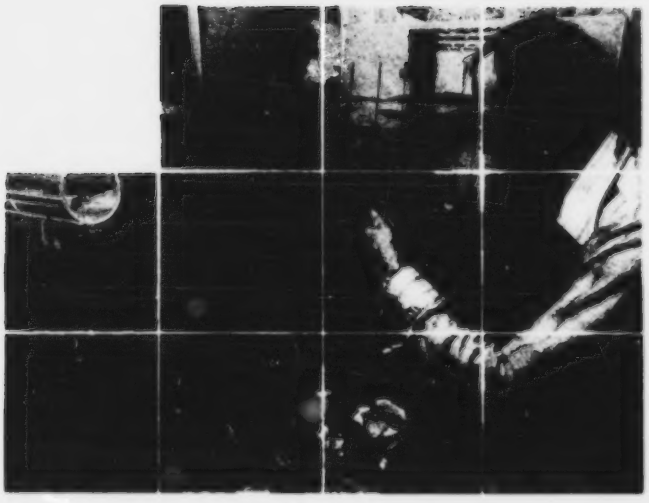
Saskatchewan Research Council Annual Report 1984-85

The Saskatchewan Research Council is an agency of the provincial government, established in 1947 to apply science and technology for Saskatchewan's development.

SRC's scientific activities, pure and applied, focus on the natural sciences, management science and engineering.

SRC is organized around four Branches: Research and Development, Technology Transfer, Administration and Finance, and the Canadian Centre for Advanced Instrumentation. Special Projects, Communications, and Marketing provide support to the Branches.

Our Mineral Resources program studies the geology of the province as it relates to mineral deposits of uranium, potash, and gold. David Quirt examines samples from a northern Saskatchewan field trip.



Annual Report from the Chairman

In these challenging times, when the only constant in business is change, SRC has proven its ability to remain responsive to client needs. Thus, 1984/85 has been a year of achievements for SRC.

The official opening of the CAD/CAM Robotics Centre marked an achievement in technology for the Saskatchewan manufacturing industry. This "centre without walls" has established a communications centre across the province that benefits manufacturers through substantial cost savings, better design, and more efficient production. SRC's CAD/CAM Robotics Centre has achieved national and international recognition for its unique simplicity and effectiveness.

During the year, SRC became actively involved in heavy oil research and development and on June 1st, 1985 established its Petroleum Division. With its involvement in heavy oil research, SRC is now actively participating in programs associated with every major resource in Saskatchewan.

Other areas of special expertise at SRC have also experienced significant achievements:

- The Slurry Pipeline Development Centre has world class expertise in the transfer of solids through pipelines. Interesting contracts continue with national and international clients.
- The Canadian Centre for Advanced Instrumentation (CCAI) achieved one of the objectives set for it this year when it became totally self-funding.
- The Saskatchewan Remote Sensing Technology Enhancement Program has demonstrated the value of remote sensing technology for the management and monitoring of Saskatchewan resources.
- As an ongoing commitment to our association with the Universities, SRC has signed Memoranda of Understanding with the University of Saskatchewan and the University of Regina.
- The Students In Industry Program administered by SRC achieved significant success in job creation. This Program provides valuable experience to the student, and at the same time transfers current technology and information to Saskatchewan companies.

These are a few of the significant achievements. Others include working more closely with rural Saskatchewan in initiatives such as computer utilization, fish farming, and farm energy management.

International activities have also accelerated during the past year, with SRC working around the globe to develop new business and marketing opportunities for and with our clients.

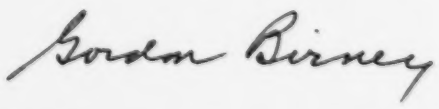
The activities of SRC are expanding. The services provided by SRC in the areas of research and development are in demand. The need for adequate space for laboratories and offices prevails. The Government of Saskatchewan recognizes the needs of SRC relative to its space requirements. Their arrangements to move us to Innovation Place indicates this support. I appreciate their assistance in helping us in these endeavours.

There have been changes to the Board of Directors during the past year. Two of our members, Mr. J.P. Melin and Dr. K.J. McCallum, retired. On behalf of the Board, I would like to thank these members for their valuable contributions.

I am pleased to welcome to the Board Dr. Howard Tennant, Dean of Graduate Studies and Research, U of S, Saskatoon, and Mr. Bill Whelan, Manager of the Saskatchewan Division of the Canadian Petroleum Association, Regina.

The Government of Saskatchewan has assisted us in a very positive way. I would like to emphasize that having a strong, understanding and supportive Minister, the Honourable Gordon Currie, has been a focal point in the achievements of SRC during 1984-85.

The Saskatchewan Research Council is rich in that most important resource — the human resource. We have an exceptional staff of dedicated people who combine their knowledge and experience in a most effective manner. Indeed, this has been a year of achievement for the people at SRC. Our President, his management and staff working internally as a team, and externally, as a partner with industry, the Government, and the people of Saskatchewan, have accomplished much. They have demonstrated their ability to pool their ideas and talents with those of others to develop innovative programs that help in the development and advancement of Saskatchewan. They are truly partners in innovation. In my opinion, this assures a promising future for SRC, and for Saskatchewan.



Gordon Birney, C.A.
Chairman of The Board of Directors

President's Annual Report

Change in today's world is no longer something that happens now and again; it is a way of doing business. At SRC, doing business means staying responsive to the changing needs of our clients; it means developing programs that are in tune with the marketplace yet flexible enough to adapt to change.

In carrying out its mandate, "applying science and technology for Saskatchewan's development", SRC has developed strong working relationships with business and industry, the universities, and provincial and federal government departments. The development of these networks is essential among the organizations that make things happen in Saskatchewan, for without these ties change becomes a burden rather than a catalyst to progress. It's the collective strength of committed people that makes meaningful development a reality. At SRC, we know this to be true.

When Saskatchewan business and industry tell us of the technologies they need to maintain high productivity, to gain competitive advantage, and to introduce innovative products, we respond. We develop programs, with the necessary tools and techniques, to help our clients to adopt the advanced technologies. Our ability to do this has been demonstrated this past year through programs such as the CAD/CAM Robotics Centre, the Canadian Centre for Advanced Instrumentation (CCAI) and our Remote Sensing program, to name just a few. Each of these programs was developed to meet a perceived future need — and they were in place in time to respond to the needs of industry and government. SRC is an active and results-oriented component of Saskatchewan's technological infrastructure.

Business leaders are part of SRC's planning for the future. These people help SRC develop and operate its programs through technical and management advisory committees.

SRC's total revenue for 1984/85 was $10,859,021, which is one-half million dollars over last year's revenues. The Government of Saskatchewan continued to show its support for research and development in Saskatchewan through a provincial grant to SRC of $4,106,300. As well, $325,000 was provided for a Students In Industry program that has assisted both with job creation and transfer of the latest information and technology to business and industry. $6,200,135 was generated through work with business and industry, and provincial and federal government departments, with $227,586 raised from other sources. In total, excess of revenue over expenses was $9,466.

For 1985/86 we are forecasting a budget of approximately $16.5 million. This includes approximately $2.8 million additional dollars due to our involvement in heavy oil research and development, and increased funding to $1.8 million for the Students In Industry/Graduates In Industry job creation program.

SRC recognizes that small and medium enterprises have an urgent need for information on technical services to assist them in improving productivity and competitiveness. Our four Branches, Technology Transfer, CCAI, Research and Development, and Administration and Finance, maintain close contacts with industry, and respond quickly to the needs of the private sector. Through our Special Projects Division, we work on opportunities and initiate collaborative projects with industry, governments, and with educational institutions.

SRC services the needs of resource-based industries, energy conservation, agriculture, and is, in effect, a research and development arm for hundreds of small and medium-sized enterprises.

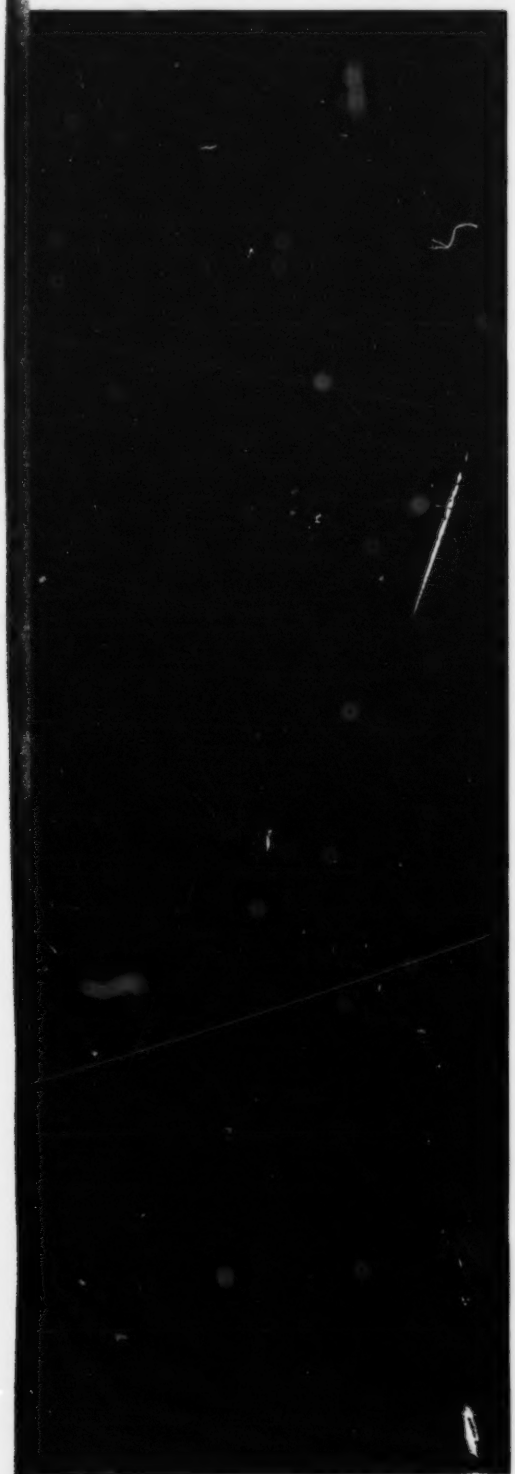
Our two most important values, our clients and their needs, and our staff and their expertise, receive our continued commitment to excellence as we grow and develop in concert with our role of applying science and technology for Saskatchewan's development.

I thank our Board of Directors for their continued commitment to assure we are truly serving the needs of our clients and that we are prepared and equipped to do so.

We also express our thanks to the various provincial and federal government departments and their employees, and to the universities and technical schools for working with us as we assure our services meet the priorities of our government and clients. For their continued support, we extend a sincere thanks to our clients, who turn the results of our efforts into economic activity and job creation.

Jim Hutch
President

SRC's Slurry Pipeline Development Centre operates a slurry pipeline test facility unique to North America, in terms of its pipeline sizes. Joe Lychak (left) and Mike Small (right) conduct a test in a 500 mm (20") diameter pipe loop.



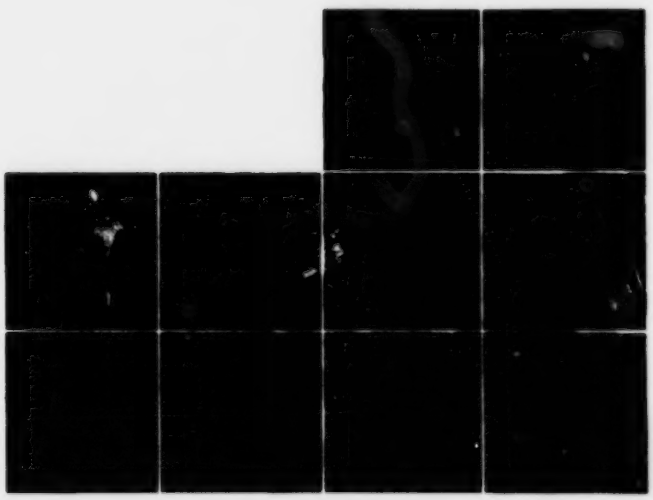
Research and Development Branch

The development needs of Saskatchewan determine the direction of SRC's largest program area: the Research and Development Branch. Three Divisions, Resources, Environment, and Petroleum (effective June 1, 1985), embrace the 14 program areas managed by SRC personnel.

The Resources Division provides applied research, development and demonstration projects in response to Saskatchewan's growing industrial, agricultural, and resource-based economy. Activities include mineral exploration; mapping and identification of the Quaternary sediments that blanket the province; developing new and improved industrial products and processes for provincial industry, such as finding a better way of moving coal, oil, minerals and other raw materials; identifying Saskatchewan crops and native plants that can be turned into products; and researching and applying energy conservation techniques for farming. The Division also operates a geochemical services program for in-house projects and the provincial mining industry.

The Branch's Environment Division complements the work of the Resources Division. Scientists provide research on the maintenance, management, and improvement of the water, land, and air resources of Saskatchewan. Emphasis is placed on assessing the environmental impact of present and future industrial activity, transportation, and other major developments.

Test pipelining of solids at the Slurry Pipeline Development Centre requires a high capacity pump. Del McEwan checks the motor drive system.



Over the past two years, a Remote Sensing Centre has been established in the Division to interpret and monitor the precious, natural, resources of the province through the use of satellite imagery.

In our new fiscal year, the Research and Development Branch brought a new resource area into the Saskatchewan Research Council — petroleum. Heavy oil is the Division's target.

Mineral Resources

SRC is responding to the new emphasis on gold exploration in the province by undertaking studies of the genesis of gold deposits. The first phase of lithogeochemical (rock chemistry) studies is underway at the Rio Mine at Flin Flon, and at the Weedy Lake, Waddy Lake and Wedge Lake properties in the La Ronge Belt of northern Saskatchewan. The work is leading to a better understanding of the mechanisms of gold deposition and thereby aids the exploration industry in developing more effective exploration strategies.

This type of research best characterizes the work conducted by SRC's Mineral Resources program. Scientists study the geochemistry, mineralogy, and geology of the province's metallic mineral deposits in a systematic manner to develop genetic models that are used to aid mineral exploration and development. They also develop and refine lithogeochemical data to improve the effectiveness of data interpretation in mineral exploration projects.

The cost of these research activities is substantially less than the cost of even a few diamond drill holes in an exploration program. As a result, the program attracts clients from both the federal and provincial governments, as well as private mining companies, petroleum companies, and mineral exploration and development companies.

Although emphasis is placed on providing support to the province's gold exploration projects, research continues to be applied to one of Saskatchewan's major metals, uranium. A report has been prepared on the relationship between the history of the development of the Athabasca Basin and the formation of the unconformity-type uranium deposits found in the Basin. The report is part of a continuing program of metallogenetic studies of uranium deposits in Saskatchewan.

The focus on uranium and gold come together in a project initiated in the Uranium City area. Scientists are investigating the relationship between regional soda metasomatism, a process of chemical and mineralogical transformation of rocks, and the uranium and gold mineralization in the area. The project involves both field and laboratory studies.

Sedimentary Resources

The geology and groundwater conditions in Saskatchewan are investigated by this program to evaluate groundwater supplies and aid in mineral exploration, aggregate (sand and gravel) development, geotechnical investigations, and environmental studies.

Geology and groundwater information in the form of maps, cross sections and other data are being compiled in areas throughout the province such as Saskatoon, North Battleford and Melville. These compilations establish the geological framework, define aquifers (water-bearing deposits) and indicate the characteristics and potential of these water supplies.

The demand for sand and gravel resource information in the construction industry is being answered by compiling a series of 1:250,000 reconnaissance maps along with 1:50,000 scale maps in areas of high demand. Aggregate resource mapping continued in the Saskatoon and North Battleford areas. To date, six 1:50,000 scale maps of sand and gravel resources have been completed near Saskatchewan cities.

Surficial geology maps delineating surface materials and landforms are being compiled for southern Saskatchewan to provide background information for groundwater supplies, aggregate resources, and geotechnical investigations. Eight areas have been completed to date. Eventually this information for the south will be combined with the information previously collected for the northern Shield area to produce the first 1:1 million Quaternary geology map of Saskatchewan.

SRC maintains a 50-well network of observation wells, each providing an average coverage of a 5,000 square kilometer area in the southern agricultural part of the province. The network provides both a continuous record of water level trends and changes, and through sampling, a systematic investigation of long-term water quality changes.

A report titled "The Theory of Groundwater Flow in the Vicinity of Brine Ponds and Tailings Piles of Potash Plants" was completed and presents the findings of long term monitoring and research on this subject.

To aid in mineral exploration in the province, a report on the Quaternary geology of the Precambrian Shield of Saskatchewan was published which includes a 1:1 million compilation map and is accompanied by a series of 20 maps showing the geology in more detail. This work was contracted to SRC by Saskatchewan Energy and Mines as part of a Canada/Saskatchewan mineral development agreement.

Resource Processing

One of the most economical and environmentally acceptable ways of transporting large quantities of solid materials

over long distances is slurry pipelining, where the solid is suspended in a suitable liquid carrier. SRC has been studying the transport of solid materials such as coal through pipelines since 1960. Our Slurry Pipeline Development Centre has become internationally recognized for its world-class expertise in slurry pipeline technology. The facility has been financially self-sufficient since its inception.

This year slurry pipeline tests were undertaken on oil-in-water emulsions and on heavy oil-diluent mixtures. In addition, an Energy Mines and Resources (EM&R) supported study of flow conditions arising in horizontal short distance pipelining with a coarse slurry was carried out under subcontract to C.A. Shook Consulting Ltd.

Bench scale tests to upgrade the quality of Saskatchewan kaolin by chemical and mechanical treatment continued this year. The results, in terms of increased kaolin reflectance, are promising. The project is being continued under contract to Ekaton Energy Ltd.

The fabrication of instrumentation for underground installation in potash mines, to monitor ground conditions, continued at a substantial level. The EM&R-supported project designed to test and commission one triaxial pressure cell for testing large potash cores and other soft material was completed. The upgrading of additional cells is in progress.

The Resource Processing program also encompasses the operation of a multipurpose pilot plant where mineral processing projects related to gold and uranium are handled.

Biomass Resources

Agriculture, the largest single industry in Saskatchewan, produces a variety of plant products that SRC scientists study in order to enhance production and develop new processing methods and markets. In all cases, projects are aimed at either assisting the primary producer or the secondary processor. Most of these projects are carried out in cooperation with agricultural scientists at Agriculture Canada Research Stations, the University of Saskatchewan, and private consultants.

In the case of SRC's Farm Energy Management program, primary producers are benefiting from a number of energy conserving practices that were identified and demonstrated on 22 Saskatchewan farms. The final report was published this year and given wide distribution with Saskatchewan Agriculture Department assistance. Among the many highlights of the report, and more recent studies, is the finding that it is possible to design more energy efficient stubble cropping systems than the present system most commonly used, e.g., spring wheat stubble crop with no snow management. With the appropriate combinations of crop (winter wheat), reduced tillage, and snow management, a return of about 50 per cent more wheat per unit of fuel and fertilizer energy can be realized. Substantial net income advantages were attained as well.

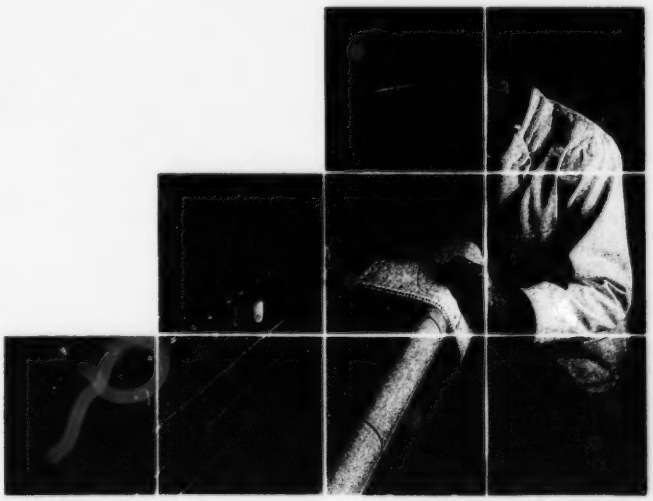
A canola management study done by Alberta Agriculture was analyzed for its energy effects by our scientists. They found the main reason "high yield" farmers enjoyed a more efficient use of energy and more net income was related to their level of skill, not the slightly larger amount of energy used. For example, the best farmers did more minimum tillage, employed more tillage operations in the fall and less in the spring, prepared a better seedbed, fertilized more in the fall and less in the spring, and used more deep banding of fertilizer. The best farmers achieved 60 per cent more canola per unit of fuel and fertilizer energy spent.

Studies on the feed value of wheat chaff for cattle continued this year. Comparisons were made between the chaff of Neepawa hard red spring wheat and Norstar winter wheat. Both chaffs were improved significantly in feed value by ammonia treatment. After ammoniation both chaffs were comparable in feed value to medium quality hays.

Kochia and a number of more conventional crops were evaluated as high yielding forage crops for saline soils, or as new raw materials for conversion into fuel additives and other industrial products.

Kochia showed promise as a high yielding forage crop for saline soils, and results from several years' trials indicate potential for using such soils for kochia forage production. Our scientists continue to work cooperatively with Agriculture Canada to develop kochia into a new forage crop.

White rot fungi (*Pleurotus* species) were further evaluated for their ability to produce edible mushrooms and break down lignin and hemicellulose polymers in the wheat straw and



In our Biomass Resources laboratory, Krystyna Sosulski scans the absorption spectrum of plant materials tested in a spectrophotometer.

chaff the mushrooms grow on. Protein supplements to wheat straw increased the yield of edible mushrooms but decreased the enzyme degradation of lignin in the straw. Studies continue this year to attempt to develop a small industry to produce these mushrooms in western Canada.

Buildings and Energy Technology

Energy resources are important to Saskatchewan's residents. Our cold climate places heavy demands on heating and energy systems in houses and buildings. The Buildings and Energy Technology Program continues research in conservation of energy resources for existing homes, and improved energy standards for new construction.

Published program research in this year received wide distribution as a result of our work with the federal government. Our guide to *Energy-Efficient House Construction,* published by Canada Mortgage and Housing Corporation (CMHC), received an award for excellence in technology transfer, as did our draft manual on *Air Sealing Homes for Energy Conservation,* published by the Department of Energy, Mines and Resources.

Our study on the indoor use of caulks and sealants is being used by building specialists in Canada and the United States.

Buildings and Energy Technology program plays a leading role on several committees of the Canadian General Standards Board (CGSB), and our work on insulated cladding has been developed into a CGSB Standard.

Contract research this year looked at the development of new home heating fuels from chaff, and the use of inflatable structures in northern areas.

A new program facility opening in 1985/86 will increase our capacity for additional contract work. The Product Development and Testing Laboratory will provide an important service in the energy products field.

Geochemical Services

Saskatchewan's mining exploration industry requires a wide variety of geochemical analyses of rocks, ores, minerals, sediment and vegetation samples as part of mineral exploration programs.

The Geochemical Services staff work closely with the mining exploration industry to provide research in the development of new analytical techniques. The service is also a key resource used by other SRC projects related to the mining industry.

The facility is a modern analytical laboratory which this year processed 21,000 samples, an increase of 23 per cent over the year previous. Major clients using Geochemical Services are: Saskatchewan Mining Development Corporation (SMDC), Uranerz, Eldor Resources, Key Lake Mining, Saskoil and Saskatchewan Energy and Mines.

Petroleum Division

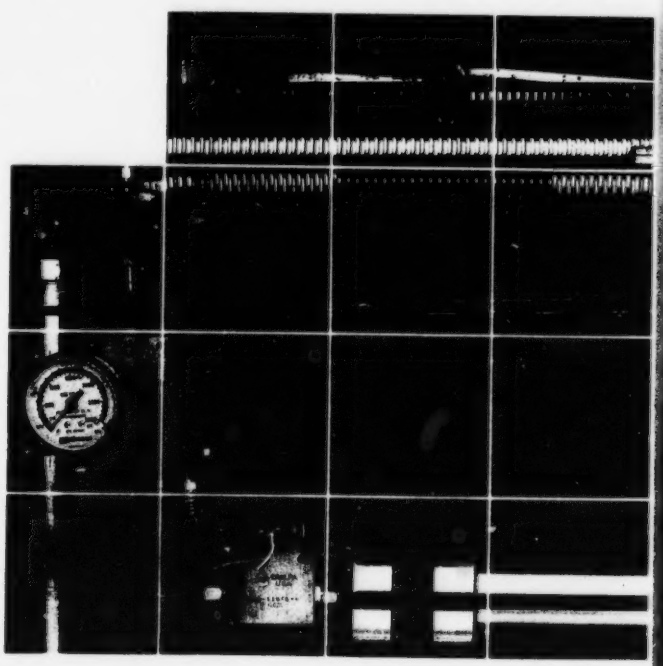
In June, 1985, SRC acquired the heavy oil lab formerly owned by Saskoil. This fully equipped facility and its staff form the nucleus of SRC's Petroleum Division.

Although the Division was acquired during the 1985/86 fiscal year, it is appropriate to comment on the acquisition in the pages of this 1984/85 Annual Report due to the amount of preparation and anticipation that took place in the months that preceded the actual acquisition.

The Petroleum Division, based in Regina, operates with a staff of 31 people as a centre of technical expertise. The program's emphasis is on Saskatchewan heavy oil. Current projects address a range of technical problems associated with heavy oil, involving enhanced oil recovery techniques, production, treating, upgrading, and refining. The Division is also working on the enhanced recovery of light and medium oil to complement the heavy oil program. In addition, analytical and technical information services are provided.

To guide the Petroleum Division through its formative phase, and to ensure future activities will meet the needs of industry, a technical committee and a management committee, both with majority industry representation, are actively involved with the operation of the Petroleum Division.

The Petroleum Division investigates methods that will enhance the recovery and upgrading of Saskatchewan's plentiful heavy oil reserves. Complex equipment such as this core displacement apparatus simulates the use of carbon dioxide, hot water, or steam in an oil reservoir.



Environment Division

Aquatic Biology

This year our Aquatic Biology program added a new direction to its work with Saskatchewan's surface water. Our scientists are conducting research aimed at developing new products and industries from the province's aquatic resources.

SRC is now heavily involved with aquaculture research. A new hatchery and broodstock development facility is located in the aquaculture field laboratory and the fish rearing ponds. Work at SRC includes the cage culture of rainbow trout, the operation of a demonstration recirculating hatchery, growout and broodstock development in rainbow trout and the development of methods for growing arctic char in Saskatchewan. Study of arctic char is carried out with the assistance of the Freshwater Institute in Winnipeg.

Saskatchewan's position in the brine shrimp market is the focus of some program work designed to improve the hatchability of brine shrimp eggs. The feasibility of harvesting Saskatchewan crayfish as a product for domestic and export markets is being investigated.

SRC offers courses in fish farming as part of the ongoing program of aquaculture research, development, and technology transfer.

The major emphasis in Aquatic Biology has been, and continues to be, assisting industry and government to mitigate the environmental changes to surface water that can occur when water resources are developed. An excellent example of this program work is the Nipawin Hydroelectric Project. Our scientists continue to monitor surface water and groundwater to identify changes to the Saskatchewan River during the construction and early operating phases of the project. The expertise of our scientists is used to develop new monitoring guidelines and research study plans.

Major research continues on uranium mining activities in northern Saskatchewan and their effects on the lake and stream sediments and biota through radionuclide deposition. The data generated by these studies will one day assist mining companies decommission present and future mine sites. Further benefits of related studies will be a better understanding of how contaminants move through the food chains. Radio nuclides in selected plant species are also being studied.

Other work related to northern Saskatchewan is the use of pelletized cattail stems and leaves as a home heating fuel alternative. The cattail research is part of a larger project that looks at aquatic plants as a potential energy source.

SRC is western Canada's representative on a subgroup of the Long Range Transport of Atmospheric Pollutants (LRTAP) that is looking at the aquatic effects of acid rain. Guidelines are being developed by LRTAP for monitoring acidic deposition in our lakes and streams.

Terrestrial Ecology

SRC's Terrestrial Ecology Program assists industry and government to achieve land development projects that are compatible with the protection and enhancement of the environmental quality of the province's renewable land resources.

Program work continued this year on the coal spoils of southern Saskatchewan where their revegetation potential is being studied. Research is aimed at selecting the most suitable plant species and finding spoil amendments that can be used in areas where little or no topsoil is available for reclamation. To date, results indicate that conventional agronomic forage species, such as Russian wild rye and crested wheatgrass, could attain a productivity level on non-sodic spoils that is similar to or greater than that of the pre-mining conditions. Our studies on sodic spoils showed an upward migration of sodicity in the topsoil spread on the spoils. Further evaluation is underway with particular emphasis on sodic spoils.

This year marked the start of a comprehensive investigation of the radioactive contaminants in the upland vegetation of northern Saskatchewan. The study, funded by the federal government, includes uranium mining and milling sites as well as areas representing background levels of radionuclides. Radiochemical analysis and data processing are underway.

The Terrestrial Ecology program handles work for a wide variety of clients. For Saskatchewan Energy and Mines, work started on the evaluation of the effects of oil well drilling wastes on crops and soils. For Saskatchewan Environment, a report was prepared this year describing soil sampling procedures for environmental evaluation purposes. For the Canada Centre for Remote Sensing, agricultural field surveys were carried out in connection with their Synthetic Aperture Radar (SAR) Program. For Saskatchewan Power Corporation, a monitoring program is now developed that determines the environmental effects of the airborne emissions from the Poplar River Thermal Power Station. The study is bringing other program areas of SRC together: Atmospheric Processes and Analytical Services will work cooperatively with Terrestrial Ecology for at least another year.

This year also saw the completion of phase one of a three-year study of the potential effects of acidic precipitation (acid rain) on crops and forest tree species. The study was jointly funded by Saskatchewan Environment and SRC. The Saskatchewan Power Corporation is contributing in 1985/86.

A study funded this year by Saskatchewan Agriculture and SRC looked at a naturally oxidized fossil material found in large amounts in the Estevan area. The material, called leonardite, has been reported to have stimulated plant growth or improved soil characteristics under laboratory or greenhouse conditions. Its use is currently being promoted

by commercial firms as a soil additive. The SRC study sets out to determine whether the material has beneficial effects on soils and crops under field conditions.

Two private companies in the province, Saskmont Engineering Ltd., and Integrated Environmental Sciences Inc., contracted specialist services this year in the area of plant ecology. Also, our wildlife ecologist was contracted by SaskTel to identify techniques to reduce damage caused by pocket gophers to telephone cables.

Archaeology

Heritage conservation is the term that best describes the work of SRC's archaeological resource management team which, for 10 years, has been actively involved with the preservation of Saskatchewan's heritage.

In this vein, the Nipawin Reservoir Heritage Study was completed after five field seasons of work related to the construction of the François-Finlay Hydroelectric station near Nipawin. The team excavated 13 sites in the reservoir area. Pieces of tools, weapons, cooking utensils, and fragments of ornaments were recovered in the investigations that allowed the team to define the periods these sites were occupied; from 6,000 years ago through to the fur trade period of the late 1700's, and the early settlement period of the early 1900's.

Another project completed this year was the excavation at a site on Highway 41, adjacent to Wakaw Lake, while an additional section of the highway was surveyed for the presence of archaeological sites.

A large section of the Souris River valley, between Estevan and Weyburn, was the focus of archaeological surveys. The team recorded many archaeological resources, the majority of which were tipi ring sites. To date, the oldest materials recovered are thought to date to at least 5,000 years ago.

In the Weyburn region, five surveys were completed this year, all relating to oil pipelines. A survey connected with the proposed re-routing of Highway 47 through the Souris River valley near Estevan was also completed. On this survey, several sites were recorded, one of which, a late prehistoric campsite, was excavated. It produced many projectile points and potsherds. Also in the Estevan area, the construction of a water pipeline was monitored.

A section of the Red Deer River near the Manitoba border received the attention of the team this year when an archaeological survey was conducted. Two of the sites recorded were the object of limited excavation, confirming the importance of this region as a source for the type of chert (a flint-like material) once used widely by prehistoric peoples to manufacture tools. A survey was also conducted on the Saskatchewan River in the James Smith Reserve. Many archaeological sites were located within the reserve area and an 18th century fur trade post examined.

A provincially funded research project continued this year. It involves a re-assessment of the late prehistoric Selkirk culture which dates from 1200-1700 A.D. The Selkirk culture is the product of the Cree ancestors of Northern Ontario, Manitoba and Saskatchewan. The culture is characterized by a distinctive style of ceramics.

The archaeological heritage of the province is a fragile resource that is easily disrupted when a land-altering development, such as the construction of a highway, is executed. To mitigate the adverse effects of such projects, the team engage in archaeological consulting to both government and to the private sector.

Surface Hydrology

Water studies are an on-going area of interest at SRC. The importance we place on the research of this natural substance reflects the province's need to identify present and future problems that can affect the quantity and quality of Saskatchewan surface water.

Our scientists continue to develop process knowledge and management alternatives related to surface water. They are developing environmental monitoring equipment that meets the needs of Saskatchewan as well as national and international clients. This year we saw the Grand River Conservation Authority in Ontario continue to work with SRC to build better water quality monitoring stations.

The surface hydrology program also provides essential hydrologic and remote sensing input into environmental impact studies for mining and hydroelectric developments.

Remote Sensing

A program initiated this year at SRC blends manpower training with a comprehensive introduction to remote sensing, a tool for those involved with the management of Saskatchewan's land, water, forests, and wildlife.

The program, known as the Saskatchewan Technology Enhancement Program (STEP), embraces the following aim: to transfer a new technology to Saskatchewan resource agencies responsible for the protection and development of provincial resources. Eight remote sensing demonstration projects are being used to transfer technology to provincial resource managers who will evaluate the effectiveness of the technology.

The program is a cooperative effort between the federal department of Energy, Mines and Resources, Canada Centre for Remote Sensing (CCRS), and SRC, who is managing the program.

In 1972 CCRS was established to serve as a central agency for a national remote sensing program. Canada was the first country outside the U.S.A. to establish a facility to receive data

from the American-owned LANDSAT satellite. Soon after the program was established, the federal government authorized CCRS to establish an airborne remote sensing program to back-up and complement the satellite program. The data are used primarily in the following resource sectors: agriculture, forestry, geology (mining), oil and gas exploration, and hydrography.

The net effect of these program initiatives showed that remote sensing technology had a distinct and vital role to play in the management of national resources. The technology is now a proven technology and the task at hand is to begin transferring remote sensing to the provinces. For over a decade, the federal receiving station at Prince Albert, Saskatchewan, has been collecting data about the earth's surface through satellite images. The raw data have been available, but many possible users have not been able to take advantage of it because of a lack of digital analysis equipment and user knowledge.

SRC houses Saskatchewan's only remote sensing laboratory. The lab is staffed by a team of remote sensing specialists who are working cooperatively with four provincial agencies: the Department of Parks and Renewable Resources, Saskatchewan Water Corporation, Department of Agriculture and Saskatchewan Crop Insurance. Professionals within these departments are learning to use remote sensing technology to collect data related to their resource area. The Department of Agriculture, for example, is planning to map all irrigated land annually to detect the effect of soil salinity.

The STEP program is expected to run until the spring of 1987. By that time, several benefits to Saskatchewan will have been realized: an increase in the existing expertise to handle satellite data will be in place; the program will have determined the cost-effectiveness of using remote sensing in resource management and monitoring, and tests of remote sensing methods will have determined its application to local conditions. At that time the program will be evaluated and its future activities determined.

Atmospheric Processes

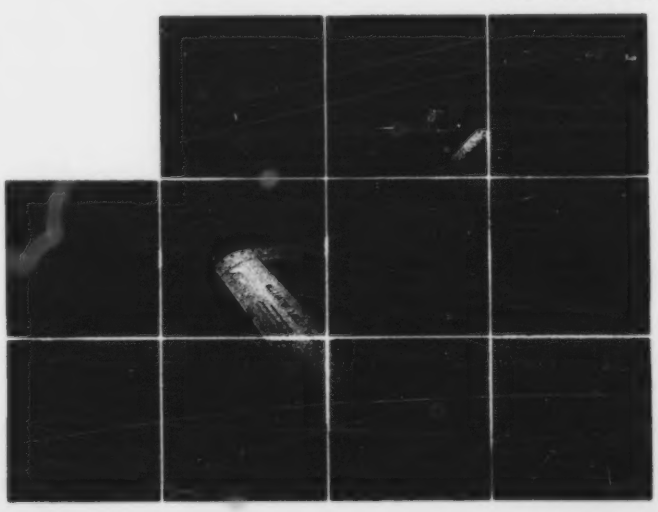
A comprehensive weather information collection system has been maintained over the past three decades. Valuable information from this system is provided to such sectors as agriculture, industry, government, the public and the media. Automation of the Climate Reference Station is in progress and will enhance this information exchange.

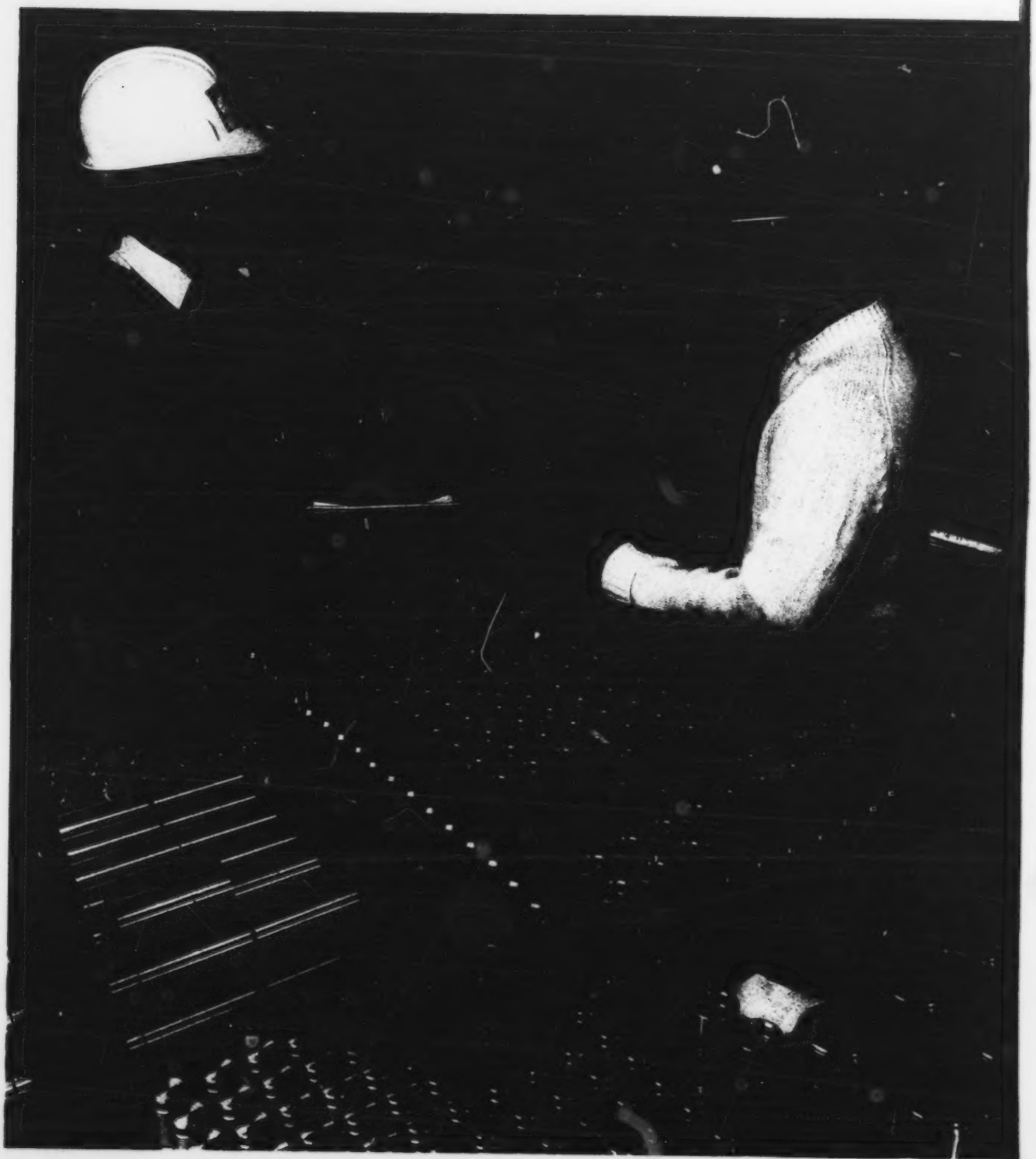
The program involves the study and classification of the behaviour of the atmosphere. More specific studies include a long-term guide of weather parameters, monitoring air pollution in the form of acid precipitation or ambient herbicides within the air, modelling the short and long-term dispersion of air pollution, and, on a contract basis, sampling stack gas emissions for provincial industries.

Acid precipitation is a major concern throughout the world. In Saskatchewan, interest has been focused on the northern part of the province, where SRC has mounted a program of sampling snow and rain for acid deposition. Major ion chemistry is used to evaluate the impact of such precipitation.

Climate change and its impacts are also a primary concern. Mean annual temperature trends at the Climate Reference Station were analyzed relative to the effects of increased atmospheric carbon dioxide concentrations. A review of the direct effects of atmospheric carbon dioxide on agriculture revealed positive effects. Impacts on agriculture, especially wind erosion, were estimated for several climate scenarios. Findings show that impacts on agriculture would generally be adverse and more intense with climatic warming and no direct effects of carbon dioxide. Air quality studies are conducted in a variety of environments, including agricultural machinery, mine and industrial sites, office buildings, hospitals and schools. These contracted studies involve investigation of suspected occupant exposure to harmful agents, as well as the testing of monitoring equipment.

SRC has introduced satellite imagery to resource managers of Saskatchewan. The Saskatchewan Remote Sensing program, a joint venture with Canada Centre for Remote Sensing, processes data from computer tapes and produces colour resource maps.





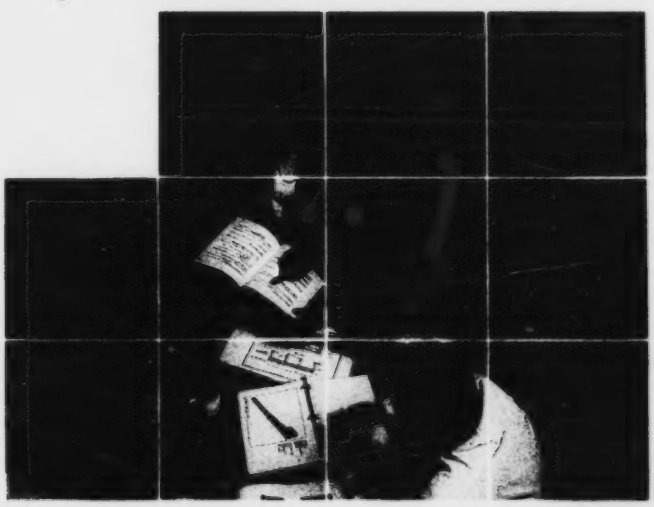
SRC's Field Services Division delivers the National Research Council's Industrial Research Assistance Program (IRAP) to small and medium-sized manufacturers. Nick Lawther (left), of SRC, provides technical advice to a manufacturer.

Technology Transfer Branch

Our Technology Transfer Branch is designed to provide the province's industrial and manufacturing sector with expertise in four areas whose Division names describe their function: Management Consulting, Product Development, Innovation, and Field Services.

The Division plays a vital role in the innovation process characterized by entrepreneurial business ideas. Branch staff work with existing technology to solve problems and apply the technology to the challenges facing clients.

The Technology Transfer Branch aids industrial managers with technical problem solving and management consulting. A team of consultants led by Alan Scharf, Branch Director (left), discusses a client's options. Around the table are Judy Poon (standing), Ravi Maithel (right), and Bart Ward (foreground).



Management Consulting

The opportunities and challenges presented to anyone operating a business can often become projects for SRC's Management Consulting program.

Program staff employ overall productivity improvement strategies and have trademarked a specific approach under the name "Cost Leadership." As a management strategy, Cost Leadership™ is designed to help business produce products or services at a lower cost than competitors. In any market, the cost leader is characterized by being the most effective profitable competitor, by maintaining the product's price and quality, and by production costs that are lower than the competition's.

The program provides industrial and management consulting services to government departments, private industry, crown corporations, municipal governments, and associations.

This year's projects covered a wide spectrum of business needs: a new materials management system was designed using the concept of Materials Requirements Planning (MRP) and Distribution Requirements Planning (DRP), marketing studies were undertaken for a farm implement company, a feasibility study for a plant expansion was completed, market research techniques were used to conduct a value analysis and redesign of a farm implement line, a market feasibility study was completed for a mining operation, and for a consumer product, a market study was conducted.

In addition to these activities, the program is participating in a research project funded by the International Development Research Centre (IDRC). The project is designed to study the process of technology adoption by small and medium-sized enterprises in Malaysia. It's a joint project undertaken by the University of Saskatchewan and SRC together with two educational institutions in Malaysia.

Saskatchewan's Product Development Management Program (PDMP) is another management resource handled by program staff. PDMP, funded by Tourism and Small Business, has assisted 35 manufacturers to date. This help has ranged from engineering design to marketing strategy development.

Regular sources of management information are supplied to clients through seminars and publications: Technology Transfer (quarterly) and Management Insights (bimonthly). They have a combined circulation of about 5,000. Seminars sponsored and presented by the program cover topics such as Materials Management, Industrial Marketing, Cost Leadership, Systems Design, Industrial Supervision, Time Management and CAD/CAM.

Product Development

The new technologies of Computer-Aided Design and Computer-Aided Manufacturing (CAD/CAM) are being introduced in an accessible manner to Saskatchewan's manufacturing sector.

The Product Development Division's CAD/CAM Robotics Centre functions as a "centre without walls" to place computer equipment, known as work stations, on the shop floors of participating companies. With staff training and technical support from SRC, the manufacturers are able to apply the technologies directly to their production needs.

Eight work stations were installed in six Saskatchewan companies this year, assisted by financial support from the Department of Regional and Industrial Expansion (DRIE) and Canada Employment and Immigration Centre (CEIC).

Some of the companies are already reporting benefits, in terms of better technical presentations, resulting in new contracts, and reduced warranty claims.

Next year the CAD/CAM Robotics Centre will work toward a demonstration of robotic welding, a key function of computer-aided manufacturing.

Specific product development activities at the Centre produced benefits that can be measured in real dollar estimates. This year three computer product analyses were done, with estimated development cost savings of $121,000. Nine agricultural product concepts were analyzed, saving an estimated $200,000. Seven agricultural products were redesigned, with estimated development savings of $280,000. Five small product computer analyses resulted in estimated development cost savings of $50,000. And two new technology development projects realized client companies an estimated $120,000.

Field Services

For over a quarter-century, the National Research Council's (NRC) Industrial Research Assistance Program (IRAP) has been operating in Saskatchewan.

At SRC, IRAP is administered in concert with NRC. Their joint objective? To assist Saskatchewan's economic development by providing industry with technological information, advice, and guidance on industrial engineering methods and techniques. It is a vital program that sees SRC's professionals work together with the province's small and medium-sized manufacturing firms. The partnership produces results. Company functions are enhanced and production operations are often improved.

The task of staying in touch and up to date with Saskatchewan manufacturers is an on-going process. The field advisors visit companies upon request to answer technical inquiries or to help identify and solve technical

problems. These services are provided at no charge and on a confidential basis.

IRAP is also designed to stimulate industrial research and development in the province. The IRAP/Saskatchewan engineers help companies access funds available from NRC to develop or improve products and processes.

The IRAP field advisors have five programs they use to apply to the various manufacturing needs and problems they encounter. They are: IRAP-C, Field Advisory Service; IRAP-H, Contributions to Firms Employing Undergraduates; IRAP-L, Contributions to Laboratory Investigations; Project-M, Contributions to Small Projects; and IRAP-P, Contributions to Large Projects.

Students In Industry/Graduates In Industry

SRC's "Students In Industry" program operated for the first time this year, extending the program to new project areas and to new clients who otherwise wouldn't be served by IRAP-H.

The program supports the employment of students in positions where their training and skills are used by an employer. Placement in the program gives students career related work experience while the employer benefits from the addition of trained manpower. This year 113 student positions were supported by 60 employers. Such a positive response by employers led to an expansion of the program in 1985/86. It was also extended to Graduates In Industry, a program designed to support the employment of recent graduates in new, permanent, full-time positions.

Innovation

SRC's Innovation Division was established this year as a bridge between product conception, research and development, and product start-up.

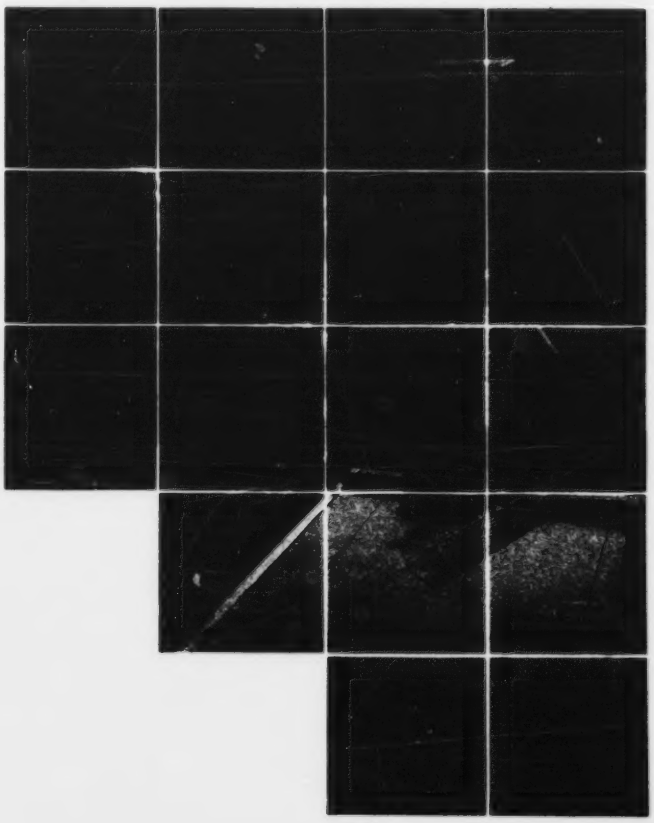
Services cover all phases of new company development and ensure that the most appropriate professionals are put in touch with the product at the right time. Assistance in initial product design and prototyping as well as pilot manufacturing is available. Marketing and technical financial feasibility studies are obtained for new ventures. Plant and process design advice is extended to clients.

The Division works closely with the Department of Regional and Industrial Expansion and Saskatchewan Tourism and Small Business to help launch economically viable products in the province.

The Division created a funding arm this year called Innocorp, which is a pilot service designed to provide assistance to innovators whose ideas pass rigorous technical screening. The aim of the program is to turn viable ideas into economic reality.

A major client of Innocorp's is the Saskatchewan Abilities Council who was assisted with the commercialization of a wheel chair lift. A team of specialists was developed for them to work with: Venables Machine Works of Saskatoon redesigned the prototype to improve overall industrial design; Exel Elevators of Saskatoon is marketing and distributing the lift; and financial assistance was provided by the National Research Council and Tourism and Small Business.

The Product Development Division delivers the benefits of new technologies to provincial manufacturers. Don Florizone, of the CAD/CAM Robotics Centre, operates a design station to draw, modify, and test machine components and entire products.



Administration and Finance Branch

The Saskatchewan Research Council provides support to its research programs through a variety of services: technical laboratories, an information centre, a maintenance shop, financial services, human resources, graphics services, safety, departmental services, central purchasing and stores.

Graphics Services

Specialized graphics services involving cartography/drafting, photography/photomechanics, audio-visual, and display presentations are provided to all SRC programs and clients.

Graphics Services maintain a complete map/air photo library of the province, which provides SRC and its clients with a valuable resource. The library is complemented by a unique 1:50,000 air photo mosaic collection covering Saskatchewan and its immediate bordering areas.

An in-house Copy Centre, providing electrostatic copying services, binding, and other report production services is part of Graphics Services.

Shops and Building Maintenance

The maintenance of SRC facilities and equipment is managed by five tradespeople. They also provide services in the design, fabrication and/or assembly of specialized equipment required by SRC programs.

Corporate/Financial Services

Under the direction of SRC's Controller, the functions of accounting, purchasing and ordering supplies are managed.

Information Centre

A complete library facility provides technical information support for all research programs at SRC. Staff have access to over 2,000 specialized databases for online retrieval of information, and can acquire documents in a variety of forms: books, government publications, microforms and inter-library loans. The information Centre distributes current SRC Technical Reports, and provides a reference information service for staff and the public.

Departmental Services

The group provides essential office services for all of SRC such as: mail, receptionist, telecommunication, and stenographic support services. During 1984/85 approximately 251 scientific publications were produced for SRC.

Human Resources

Personnel support and the coordination of training/skills development programs are provided for all line groups.

Analytical Services

SRC's Analytical Services Laboratory provides chemical, radiochemical, and materials analysis on a fee-for-services basis to private, commercial and government clients within Saskatchewan.

The laboratory specializes in three analytical areas: *water and general chemistry* where technicians are primarily involved in environmental monitoring of water, waste water, sediments, and biological samples; *radiochemical analysis*, where much of the environmental monitoring of the uranium mine-mill operations in northern Saskatchewan is provided and radiochemical analysis of all sample types for environmental base-line studies and special research projects are conducted; and *gas chromatography*, where analyses are conducted for toxic organic constituents such as polychlorinated biphenyls, herbicides and pesticides.

Over the past two years the lab has provided emergency service to several PCB spills, a tailings dam failure and several truck and rail car spills. Increasingly, the lab is providing analyses for towns and villages to ensure pollution-free water supplies. This is part of an ongoing program initiated by the Saskatchewan Department of Environment. Broad growth is occurring throughout the Analytical Services area. Contributors to growth include a highly motivated work force intent on quality control and service.

Analytical Services also encompasses SRC's radiocarbon dating laboratory, which also saw an increase in the number of specimens analyzed this year. The lab specializes in measuring the amount of radioactive carbon-14 isotope present in carbonaceious materials to determine the age of the specimen. Specimens up to 33,000 years old, of geographic, geological and archaeological interest are handled in the radiocarbon dating laboratory.

Analytical Services instrumentation ranges from chromatographs and spectrographs to a SLOWPOKE II nuclear reactor for neutron activation analyses. Its modern equipment and ongoing improvement of analytical methodology through analytical research has maintained the laboratory at the leading edge of radiochemical and analytical services in Canada.

CCAI

The Canadian Centre for Advanced Instrumentation (CCAI), is an internationally recognized resource centre devoted to solving problems in industry, education, and government through the use of innovative instrumentation.

The Centre is partially funded by a contribution from the federal Department of Regional Industrial Expansion. The funding, $200,000 over five years, ceases in 1987, the year CCAI expects to be self-supporting.

The instrumentation-related problems and products the Centre has pursued, since its inception in 1982, are paving the road towards becoming a self-funding resource centre. The MINITUBE™ Air Sampling System (MASS) developed under contract with the federal Department of National Defence (DND) was a successful product. It not only solved a difficult problem cost-effectively, but indications are that the technology developed will be successfully transferred to the marketplace both nationally as well as internationally.

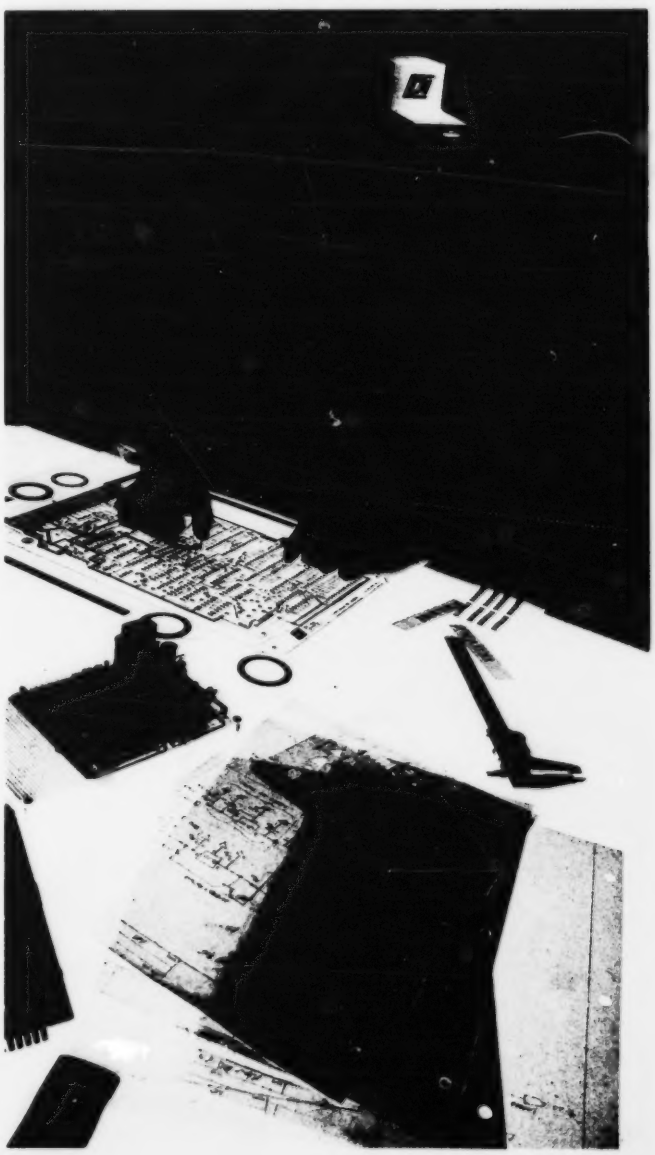
The production version of the air sampling system has been developed and 12 units were shipped to DND's Defence Research Establishment in Suffield, Alberta this year. An additional 38 units will be shipped next year.

The success of MASS prompted CCAI to investigate defence markets this year, such as other NATO countries. Market research continues in this area and other sectors: agriculture, where several projects were successfully completed; industry; and the environment. With the development of a precipitation sampler and recorder for the Water Quality Branch of Environment Canada, expertise in the Centre continues to grow in the area of environmental monitoring. The sampler is used to capture organic contaminants for later analysis.

For Saskatchewan Government Insurance, CCAI conducted an evaluation study of add-on devices for automatic headlight controls.

As in previous years, the Centre provided specialized instrument maintenance service. This CCAI service provides a benefit to the Saskatchewan industrial community. Specialized instrumentation service company depots are generally located in central Canada, eastern U.S.A., and Europe. Clients such as Saskatchewan Power Corporation, the University of Saskatchewan, and the mining industry take advantage of the expertise offered by CCAI.

The Canadian Centre for Advanced Instrumentation (CCAI) supports industry in Canada through design, service, and calibration of electronic and instrumentation equipment. Russ Pinchbeck, of the Electronics Group, produces a printed circuit board design.



Specialty Services

The activities of this area all offer direct support to ongoing SRC programs while probing the marketplace to analyze future areas of program development for SRC.

Special Projects is, for example, the program that brought SRC's remote sensing project into place and successfully transferred it to the appropriate SRC professionals who are now carrying out the project. This year Special Projects managed the signing of two Memoranda of Understanding: one was signed between the University of Saskatchewan and SRC, the other was signed between the University of Regina and SRC. Both memoranda serve to clarify the working relationship between the two institutions to enable more effective marketing of research as well as facilitate joint research.

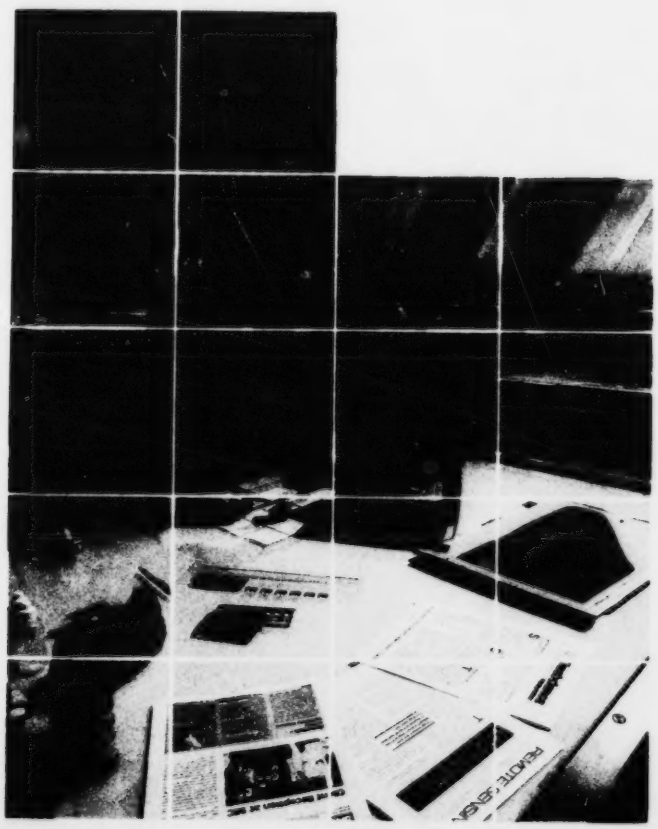
Marketing and Business Development

This year SRC identified the need for specific marketing efforts tailored to SRC's mandate: to apply science and technology for Saskatchewan's development. The marketing activities support the programs within SRC by providing information on new developments and programs as well as developing opportunities for our areas of expertise.

Communications

A variety of activities is handled by our Communications staff. News releases, SRC newsletters, brochures, and trade shows are handled by the department. Activities also include the production of an internal newsletter for staff, *Inside SRC*, coordinating tours, and supporting the marketing objectives of all SRC program areas.

Communications Department activities include production of internal and external SRC publications. Bryce Erickson, Communications Officer (right), discusses newsletter layout with Hans Piek, Graphics Technologist (left).



To the Members of the Legislative Assembly
Province of Saskatchewan

I have examined the balance sheet of The Saskatchewan Research Council as at March 31, 1985 and the statements of revenue, expenditure and accumulated surplus and changes in financial position for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, these financial statements present fairly the financial position of the Council as at March 31, 1985 and the results of its operations and the changes in its financial position for the year then ended in accordance with the disclosed basis of accounting applied on a basis consistent with that of the preceding year.

Regina, Saskatchewan,
September 13, 1985.

W.G. Lutz, F.C.A.,
Provincial Auditor.

Statement 1

As At March 31

Assets

	1985	1984
Current assets:		
Accounts receivable	$1,963,073	$1,998,833
Prepaid expenses	60,936	40,874
	2,024,009	2,039,707
Fixed assets (Note 4)	2,116,642	1,367,616
Other assets	3,939	3,939
	$4,144,590	**$3,411,262**

Liabilities and Province's Equity

Current liabilities:		
Bank indebtedness	$ 312,179	$1,064,772
Research grants payable	113,927	103,297
Accounts payable	1,502,319	600,413
Employee deductions payable	174,971	170,974
Deferred revenue (Note 5)	309,531	143,414
Vacation and benefits payable	165,588	89,421
	2,578,515	2,172,291
Long term liabilities:		
Deferred revenue (Note 5)	698,566	380,928
Province's equity:		
Accumulated surplus (Statement 2)	867,509	858,043
	$4,144,590	**$3,411,262**

(See accompanying notes to the financial statements)

Statement 2

Year Ended March 31

	1985	1984
Revenue:		
Contracts (Note 5)	$6,200,135	$6,048,050
Grant — Government of Saskatchewan	4,431,300	3,876,060
Interest	72,495	46,461
Other (Note 5)	155,091	338,324
	10,859,021	10,308,895
Expenditure:		
Salaries	6,108,089	5,940,602
Employee benefits	694,995	757,991
Supplies and technical services	2,211,254	1,771,622
Depreciation	561,785	416,457
Travel and vehicle operations	286,472	192,278
Rent and utilities	385,882	511,383
Research grants	113,553	103,297
Other	487,525	437,445
	10,849,555	10,131,075
Excess of revenue over expenditure	9,466	177,820
Accumulated surplus, beginning of year	858,043	680,223
Accumulated surplus, end of year — to Statement 1	$ 867,509	$ 858,043

(See accompanying notes to the financial statements)

Statement 3

Year Ended March 31

	1985	1984
Source of funds:		
From operations		
Excess of revenue over expenditure	$ 9,466	$ 177,820
Add (deduct) charges (credits) not involving a flow of funds:		
Depreciation	561,785	416,457
Increase (decrease) in long term portion of deferred revenue	317,638	(80,028)
Loss on disposal of fixed assets	14,281	16,226
Proceeds from sale of fixed assets	11,442	21,068
	914,612	551,543
Applications of funds:		
Reduction of conditional sales contract	—	102,886
Purchase of fixed assets	1,336,534	148,613
	1,336,534	251,499
Increase (decrease) in working capital	(421,922)	300,044
Working capital deficiency, beginning of year	(132,584)	(432,628)
Working capital deficiency, end of year	$ (554,506)	$(132,584)

e accompanying notes to the ncial statements)

1. Status of The Saskatchewan Research Council

The Saskatchewan Research Council was established pursuant to Section 3 of The Research Council Act for the purpose of research and investigation in the fields of the physical sciences, pure and applied, as they affect the economy of the Province of Saskatchewan. Under this Act, The Saskatchewan Research Council Fund was also established through which all transactions of the Council are conducted.

2. Summary of Accounting Policies

(a) Revenue Recognition

Grant revenue is recognized in the accounts as moneys appropriated by the Legislature for the purposes of The Research Council Act are received.

Revenue from the majority of contract work is recognized on the percentage-of-completion method which recognizes revenue as a contract progresses. Unbilled revenues are accrued to the year end for these contracts, while pre-billed revenues received are classified as deferred revenue.

Revenue from analytical lab work, involving shorter term contracts without substantial outlays of direct costs, is recognized on a completed contract basis.

(b) Fixed Assets

The assets of the Council are initially recorded at cost, including labour, material and overhead for self-constructed assets.

Depreciation is provided over the estimated useful lives of the assets on the following basis:

(i) Sum of the years' digits method	
Buildings	20 years
Leasehold improvements	5 years
Equipment	10 years
(ii) Declining balance method	
Automotive	33 1/3%

(c) Pension Costs

The Council participates with its employees in a defined benefit final average pension plan and, in accordance with recommendations of the Plan's actuary, contributions to the Pension Fund by the Council are made in amounts necessary to fund benefits accruing for current service and to fund past service benefits, if any, over reasonable time periods. The cost of funding the Pension Plan on the basis recommended by the actuary is reflected in these statements to the extent of contributions made to the Pension Fund in each year.

(d) Research Grants

Research grants awarded annually by the Council to aid in funding approved research projects are charged to expenditure in the year in which costs are incurred on the projects.

(e) Accrued Vacation Credits

The costs associated with vacation credits are recognized when the vacation entitlements are earned. The value of credits plus associated employee benefit costs earned to the year end but not taken are reflected as a liability.

3. Pension Plan — Actuarial Valuation

An actuarial valuation was performed as at December 31, 1983 on the The Saskatchewan Research Council Employees' Pension Plan. The actuary stated that using the accrued benefit actuarial cost method, the present value of accumulated benefits resulting from services provided to the valuation date was $4,574,382. The actuary also stated that the value of Pension Fund assets was $4,889,526 based on averaged market values. The resulting net actuarial surplus is stated to be $315,144. The report also recommends that the employer contribute at least 95.9% of employee contributions to meet the cost of benefits to be earned for service after valuation date.

The next actuarial valuation is required to be performed no later than as at December 31, 1986.

4. Fixed Assets

	1985			1984
	Cost	Accumulated Depreciation	Net Book Value	Net Book Value
Buildings	$ 762,860	$ 369,616	$ 393,244	$ 246,267
Leasehold Improvements	445,512	423,026	22,486	10,737
Equipment	4,115,420	2,475,810	1,639,610	1,052,682
Automotive	250,736	220,434	30,302	46,930
Land	31,000	—	31,000	11,000
	$5,605,528	$3,488,886	$2,116,642	$1,367,616

5. Deferred Revenue

(a) Potash Corporation of Saskatchewan

The Council has deferred revenue of $380,928 from the Potash Corporation of Saskatchewan for prepaid rent of a pilot plant. The revenue is being reflected in the accounts by the sum-of-the-years'-digits method over the 10 year term of the agreement which commenced in the 1981-82 fiscal year. The current portion of this deferred revenue is $75,286 and is classified accordingly on the balance sheet while the amount of revenue included in other revenue in the current year is $80,028 (1984 - $84,671).

(b) Government of Canada

During the year, the Council received $900,000 from the federal government under an agreement to jointly fund the costs of operating the Computer-Aided Design and Computer-Aided Manufacturing (CAD/CAM) Centre. The portion of this amount attributable to capital costs of $600,300 is being amortized in the accounts by the sum-of-the-years'-digits method over a ten year period which corresponds to the depreciation period of the assets purchased under the terms of this agreement. The amount included in contract revenue in the current year is $109,145. Of the remainder of $491,155 which is reflected as deferred revenue, $98,231 is the current portion and is reflected accordingly on the balance sheet.

The remaining $299,700 of the amount received relating to this agreement, attributable to operating costs, is also included in contract revenue. Under the terms of the agreement, the Government of Canada will contribute an additional $1,570,000 over the next four years and the Council will purchase $3,660,000 of CAD/CAM hardware and software over the first five years of the Centre's operation. In 1985, purchases of equipment totalled $747,699.

6. Related Party Transactions

Related parties to the Council are Saskatchewan's Crown controlled departments, agencies and corporations. Transactions with these parties are recorded at normal market prices except for certain buildings built for The Saskatchewan Research Council's use by the Department of Supply and Services at no cost to the Council.

7. Subsequent Event

In June, 1985, the Council established a Petroleum Division in Regina, assuming the operations of the Heavy Oil Lab previously operated by the Saskatchewan Oil and Gas Corporation. Final documentation with respect to the terms of transfer of the related assets and obligations has not been completed at the date of preparation of these financial statements.

Grants-In-Aid 1984-85

Since its creation in 1947, the Saskatchewan Research Council has provided grants to applicants in Saskatchewan universities for applied research in the sciences. Ten ongoing projects were allocated $72,000, and seven new proposals received $38,000. Of the 17 supported projects, five at the University of Regina received $35,800 and 12 at the University of Saskatchewan received $74,200.

The following projects were supported under the Grants-In-Aid program:

UNIVERSITY OF SASKATCHEWAN

Department of Agricultural Engineering
J. Gillies; J. Murray
Artificial recharge of groundwater.

Department of Applied Microbiology and Food Science
G.A. Jones; W.M. Ingledew
Production of ethanol and other liquid fuels from biomass by syntrophic fermentation.

Department of Biology
B.R. Neal
The effects of uranium mine and mill effluent on aquatic ecosystems.

Department of Chemistry
R.J. Woods
Neutron activation analysis of trace elements in soil.

Department of Civil Engineering
D.G. Fredlund
Using absorptive paper to measure matric suction for swelling and seepage problems in unsaturated soils.

Department of Civil Engineering
E.K. Sauer
Hydrogeology of saline basins (an engineering perspective).

Department of Crop Science
R. Ashford
Efficacy of herbicides as affected by application.

Department of Crop Science
R.E. Redmann
Bio-accumulation of elements by plants growing on uranium mill tailings in northern Saskatchewan.

Department of Geological Sciences
W.G.E. Caldwell; T.K. Kyser
Geochemical studies of cretaceous marine cyclothemic sequences in Saskatchewan.

Department of Home Economics
A.K. Sumner
Effect of immaturity and harvesting method on cereal crop quality.

Department of Mathematics
M.J. Miketinac
Three-dimensional airflow patterns in grain bins.

Department of Physics
K.V. Paulson
The development of the magnetotelluric method for resource exploration in Saskatchewan.

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Department of Chemistry
K.E. Johnson
Chemical studies of acid rain impact.

Department of Energy Research
D.G. Vandenberghe; J.H. Weston; A.G. Law
Energy efficient masonry blocks.

Department of Engineering
J.C. Mozel
CAD/CAM training consortium (CAD/CAM service and research centre - south).

Department of Geology
G.R. Parslow
Trace elements (particularly base metals of economic interest) in the Flin Flon volcanics.

Department of Regional Systems Engineering
F.A. Curtis
Transportation energy modelling in subdivisions: year 3.

Scholarships

The government of the province of Saskatchewan offers graduate research scholarships, tenable at either the University of Saskatchewan or the University of Regina. The purposes of the awards are to assist graduate students to prepare for careers in scientific and industrial research, and to create interest in the exploitation of Saskatchewan's resources and in techniques that will advance the development of the province. SRC conducts the selection of the candidates.

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